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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No:	09/557,151
Applicant:	Tsutomu YAMAZAKI
For:	APPARATUS, METHOD, AND COMPUTER PROGRAM PRODUCT FOR IMAGE PROCESSING
Confirmation No.:	9300
Customer No.:	24367
Docket No.:	15162/01860
Filed:	April 25, 2000
Group Art Unit:	2624
Examiner:	Anh Hong Do

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313–1450
Dear Sir:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: **MS APPEAL BRIEF - PATENTS**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

February 3, 2004
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Douglas A. Sorensen
Name of Applicant, Assignee, or Registered Representative

Signature

February 3, 2004
Date of Signature

BRIEF FOR APPELLANT

This is an appeal from the Final Rejection dated July 14, 2003, rejecting claims 1-15 in the present Application. A Notice of Appeal was filed on December 11, 2003 resulting in an Appeal Brief due date of February 11, 2004.

This brief is submitted in triplicate.

This brief is accompanied by a Response Transmittal and Fee Authorization, authorizing the requisite fee of $330.00 as set forth in § 1.17(c). In the event that the Response Transmittal and Fee Authorization is not enclosed, please charge any required fee (other than an issue fee) during the pendency of this Application to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Please credit any excess payment to the same account.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time under 37 CFR § 1.136(a) for a period of time sufficient to enable this document to be timely filed. Any fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 CFR §§ 1.16 and 1.17, other than an issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account 18-1260. Any refund should be credited to Deposit Account 18-1260.

REAL PARTY IN INTEREST (37 C.F.R. § 1.192(c)(1))

The real party in interest in the present Application is Konica Minolta.

RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 1.192(c)(2))

There are no related appeals or declared interferences which will directly affect or be directly affected by the present Application to the knowledge of the undersigned.

STATUS OF CLAIMS 37 C.F.R. § 1.192(c)(3)

This Application is a continuing prosecution application of U.S. Application Serial No. 09/557,151 filed on April 25, 2000, and claims priority from Japanese Patent Application No. 11-118578 filed April 26, 1999.

The Application was filed with fifteen (15) claims. Claims 1-15 stand rejected and are the subject of this appeal. Claims 1-15, a total of 15 claims, are now pending.

The status of the claims is, therefore, believed to be as follows:

Allowed claims:	none
Claims objected to:	none
Claims rejected:	1-15

Appellants hereby appeal the Examiner's final rejection of claims 1-15 in this matter which presently stand rejected over the cited references of record.

Claims 1-15, as amended, are set forth in Appendix A (attached hereto) pursuant to 37 C.F.R. § 1.192(c)(9).

STATUS OF AMENDMENTS (37 C.F.R. § 1.192(c)(4))

No amendments were filed by Appellants in their Response filed on October 8, 2003 to the Final Office Action dated July 14, 2003. Therefore, there are no outstanding amendments that have not been entered.

SUMMARY OF INVENTION (37 C.F.R. § 1.192(c)(5))

The present invention relates to a method and system for compressing digital image files. Digital images comprise picture elements (pixels) having a color and/or tone density value for each pixel. This can lead to a large amount of data for each image, which require storage space to store and bandwidth to transmit. To minimize the storage and bandwidth loads, images are compressed using one of many compression techniques. One of those techniques is the discrete cosine transform technique. This a well known technique, but it can cause imperfections in the decoded image. For example, severe pixel

to pixel transitions can create "mosquito noise." Mosquito noise is essentially mis-decoded pixels (see Figure 8A).

To minimize mosquito noise, a described embodiment of the present invention uses a region detector 18. Region detector 18 determines if a region of an image to be encoded is an edge region, and is thus likely to have a severe density transition. If an edge region is detected, the edge region data is processed to reduce the density difference of the edge region in the density conversion unit 13. In one embodiment, this density difference is reduced by converting the pixel data in the edge region from eight-bit data to seven-bit data (page 10, line 1 – page 12, line 10, Figures 3A, 3B, 4A and 4B). This process essentially divides the data for each pixel by one half. The result is an edge region having a smaller difference between high density and low density pixels, and thus is much less prone to mosquito noises. The image is then encoded using discrete cosine transform techniques. When the image data is decoded, the edge data is restored to eight bit data by density restoring unit 17.

ISSUES PRESENTED FOR REVIEW (37 C.F.R. § 1.192(c)(6))

Issue No. 1: Claims 1-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,862,264 to Ishikawa et al ("Ishikawa"). Thus, the issue is whether the teachings of this reference show or suggest all of the limitations of the claims.

GROUPING OF CLAIMS (37 C.F.R. § 1.192(c)(7))

In regard to Issue No. 1, in order to make the appeal process as efficient as possible and for the purposes of this Appeal only, Appellants agree to have the claims of Issues No. 1 considered in three groups:

a first group consisting of Claims 1-5, which stand or fall together;

a second group consisting of Claims 6-10, which stand or fall together; and

a third group consisting of 11-15, which stand or fall together.

The reasons why the above three groups are considered separately patentable are presented in the appropriate part of the argument provided pursuant to 37 C.F.R. § 1.192(c)(8).

ARGUMENT (37 C.F.R. § 1.192(c)(8))

As this Appeal concerns rejections only under 35 U.S.C. §103, this section includes only arguments pursuant to 37 C.F.R. § 1.192(c)(8)(iv).

A. Cited References

The Examiner relied upon one reference in the Final Office Action: Ishikawa. In order to avoid undue repetition of background information and needless restatements as to the subject matter of this reference, a discussion of the references is provided here.

For each respective discussion of the above reference in view of the aforesaid issue, a shorter treatment of the appropriate references shall be provided. Where appropriate, the reader will be referred back to this section to review a reference, if necessary.

The Ishikawa Patent

The Ishikawa patent shows a process for compressing a digital image known as fractal encoding. To perform fractal encoding, compression patterns BDP are extracted from each domain block BD of the image. The compression patterns are compared to the image and the pattern having the smallest differences between the image and the

compression pattern is selected (*i.e.* the fractal). The image is then encoded using fractal encoding.

In preparing the image for encoding, a smoothed image GF is extracted from the original image GA. The difference between the smoothed image GF and the original image GA is then encoded separately as the edge image GE (column 4, line 64 – column 5, line 8). As show in figures 17A and 17B, a correction process is applied to the edge image GE1, as illustrated in figure 17A, to remove all of the edge image elements below a selected threshold T1 (Th in the figures, see column 11, lines 16-26). The resulting corrected edge image GEa1 is illustrated in figure 17B. This image is then coded using "reverisble image compression" (Step #16). The removed edge elements are then decoded in parallel to the fractal coding (Step #21 and 22) and added back to the smoothed image GF1.

B. Issue One

The claims 1-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ishikawa.

1. Group I

Claims 1-5 are directed to an apparatus for image processing. In contrast to the cited prior art, claim 1 includes the steps of:

> a density conversion unit for reducing a density difference within the edge region detected by said region detector;

> a compression unit for compressing the image data within the edge region where the density difference is reduced by said density conversion unit, using discrete cosine transform ...

The Examiner argues that the structure in Ishikawa that deletes the subthreshold pixels in the edge region corresponds "a density conversion unit for reducing a density difference" and the structure that compresses the corrected edge image in Ishikawa corresponds to the "compression unit." As stated in the Final Office Action of July 14, 2003 at page 2:

> Ishikawa clearly teaches generating of corrected edge image GEa1 by erasing the minute edge images GEm from the edge image GE1 (col. 12, lines 43-44) and then encoding said corrected edge image GEa1 by reversible image compression (col. 12, lines 51-52). In other words, Ishikawa fully discloses reducing a density difference within the edge image region detected by the edge detection means (as disclosed in col. 12, lines 36-38), and compressing the image data within the edge region (i.e. the corrected edge image GEa1) where the density is reduced.

However, this analysis confuses reducing a *density* with reducing a *density difference*. By removing the minute edge regions of GE1, Ishikawa certainly reduces the overall density of the edge region. However, that is not what is claimed in claim 1. Claim 1 claims that the density reduction unit reduces the density *difference*. That is, the difference between the higher density pixels and the lower density pixels is reduced (*see* Applicant's written description page 10, line 6 – page 11, line 16). That means that the density of the highest pixels are lowered, the density of the lowest pixels is raised, or both.

Ishikawa teaches the opposite. The density of the lower density pixels that are below a threshold Th are *lowered* to zero (FIG. 17(B)), while the density of the pixels above the threshold are unchanged. This actually *increases* the density difference between the lower pixels (which are reduced to zero density) and the higher density pixels. Thus, Ishikawa not only does not teach reducing a density difference as in claim 1, it teaches away from this limitation of claim 1. Thus, the cited reference does not show or suggest "reducing a density difference within the edge region." To support a *prima facie* case for

obviousness based on a single reference, the reference as modified must show or suggest every limitation of the claim. MPEP §2143.03. Thus, the cited reference does not support a *prima facie* case for obviousness and claim 1 is not obvious over the cited prior art. Claims 2-5 are dependent upon claim 1. A claim that is dependent upon a non-obvious claim is also non-obvious. MPEP §2143.03. Therefore, claims 2-5 are also non-obvious.

2. Group II

Claims 6-10 are directed to a method for image processing. Also in contrast to the cited prior art, claim 6 includes the steps of:

> detecting an edge region within an image data;
> reducing a density difference within the edge region;
> compressing the image data within the edge region where the density difference is reduced, using discrete cosine transform ...

As noted above, the cited reference does not show or suggest reducing a density difference in an edge region and encoding that region using a discrete cosine transform. Therefore, claim 6 is not obvious over the cited prior art. Claims 7-10 are dependent upon non-obvious claim 6. Therefore, claims 7-10 are also non-obvious.

3. Group III

Claims 11-15 are directed to a computer program product for image processing. Also in contrast to the cited prior art, claim 11 includes a computer program product that performs the steps of:

> detecting an edge region within an image data;
> reducing a density difference within the edge region;
> compressing the image data within the edge region where the density difference is reduced, using discrete cosine transform ...

As noted above, the cited reference does not show or suggest reducing a density difference in an edge region and encoding that region using a discrete cosine transform.

APPENDIX A

(37 C.F.R. § 1.192(C)(9))

1. An apparatus for image processing comprising:

a region detector for detecting an edge region in an image data;

a density conversion unit for reducing a density difference within the edge region detected by said region detector;

a compression unit for compressing the image data within the edge region where the density difference is reduced by said density conversion unit, using discrete cosine transform; and

an expansion unit for expanding the image data compressed by said compression unit.

2. An apparatus as claimed in claim 1, wherein said density conversion unit converts N-bit image data into (N-1)-bit image data.

3. An apparatus as claimed in claim 2, wherein said density conversion unit increases a density value of the converted (N-1)-bit image data a certain amount.

4. An apparatus as claimed in claim 1, further comprising an image reader for reading a document wherein said image data is an image data outputted by said image reader.

5. An apparatus as claimed in claim 1, further comprising a printing unit for printing an image data on a paper wherein said image data is the image data expanded by said expansion unit.

6. A method for image processing comprising the steps of:

detecting an edge region within an image data;

reducing a density difference within the edge region;

compressing the image data within the edge region where the density difference is reduced, using discrete cosine transform; and

expanding the compressed image data.

7. A method as claimed in claim 6, wherein said step of reducing a density difference is a step of converting N-bit image data into (N-1)-bit image data.

8. A method as claimed in claim 7, wherein said step of reducing a density difference includes a step of increasing a density value of the (N-1)-bit image data by a certain amount.

9. A method as claimed in claim 6, further comprising a step of reading a document and generating an image data to be processed.

10. A method as claimed in claim 6, further comprising a step of printing the expanded image data on a paper.

11. A computer program product for image processing comprising the steps of:

detecting an edge region within an image data;

reducing a density difference within the edge region;

compressing the image data within the edge region where the density difference is reduced, using discrete cosine transform; and

expanding the compressed image data.

12. A product as claimed in claim 11, wherein said step of reducing a density difference is a step of converting N-bit image data into (N-1)-bit image data.

13. A product as claimed in claim 12, wherein said step of reducing a density difference includes a step of increasing a density value of the (N-1)-bit image data by a certain amount.

14. A product as claimed in claim 11, further comprising a step of reading a document and generating an image data to be processed.

15. A product as claimed in claim 11, further comprising a step of printing the expanded image data on a paper.